CHAPTER 8

Partnerships and Collaborations

The U.S. metalcasting industry is emerging from two decades of consolidation and attrition in its ranks. The companies that survived are smarter and more competitive, yet they still face significant competitive and technological challenges to their position as a leading player in the world market. Collaborative relationships with partners from both the public and private sectors, including government agencies, supplier companies, non-profit professional societies, and academia, are necessary for the industry to overcome these challenges.

Current Situation

The industry's largest collaborative partner (in financial terms) is the U.S. government. In the past several years, the Federal government has invested approximately $50 million, much of which was matched by the industry, in metalcasting research. The U.S. Department of Energy (DOE) has been the largest government participant but the National Institute of Science and Technology, the National Air and Space Administration, the National Science Foundation, and the former Bureau of Mines have also contributed. DOE works cooperatively with the Cast Metal Coalition, an industry consortia that has developed legislation adopted by Congress to sponsor cost-sharing, energy-related research.

The industry's closest collaborative partner, however, is its equipment and materials supplier base. In many instances metalcasters, casting customers, and equipment and material suppliers are collaborating in government and industry-sponsored research projects.

Metalcasting trade associations, through technical meetings, trade shows, and published materials, provide a focal point around which metalcasters can gather to solve common problems. The American Foundrymen's Society (AFS) works with various government offices and agencies to make them aware of the need for metalcasting research. AFS also manages separately formed research consortiums to fund activities in areas of common interest.

Other trade associations are also involved in collaborative efforts. For example, the North American Die Caster's Association is a partner with other companies and trade associations in Ohio State University's Engineering Research Center for Net Shape Manufacturing, a research consortium funded jointly by the member companies and the National Science Foundation. The Ferroalloy Association is attempting to enhance internal market opportunities through cooperative agreements on shared technology with foreign partners.

Recently, the six major metalcasting trade associations have collaborated to form the American Metalcasting Consortium (AMC), allying the thousands of small and medium-sized metalcasters within the

market with the goal of re-establishing the viability of the U.S. metalcasting industry. The AMC's primary focus is on technology transfer. The Defense Logistics Agency (DLA) is providing program management to the AMC, giving the consortium access to DOD design engineers and facilities. Currently the DLA, the AMC, and the University of Northern Iowa are jointly developing a linkage between all of the national Manufacturing Technology Centers and the U.S. metalcasting industry.

The industry also works with state governments in addition to Federal agencies. Several U.S. states have begun to establish regional manufacturing networks to help small and medium-sized businesses adopt new technologies. The programs work through the local community college or school system to provide centers in the immediate area of the foundries. Some states have adopted the concept of the cluster, a group of foundries that are within a relatively small geographic area and are supported by a common outreach program. The use of clusters facilitates technology transfer between the participating foundries and also provides opportunities for those foundries to draw on the resources of national networks and various professional societies.

Trends and Drivers

Emerging metalcasting markets in the future will lead to further industry competition, accelerating the recent partnering trend and ushering in a new era of connectivity between metalcasters, their suppliers, and their customers. Equipment suppliers already play an important role in the development and deployment of new foundry technology and the training of foundry personnel to use this technology. Because of this role, equipment suppliers are considered to be the primary technology transfer mechanism throughout the metalcasting industry. Similarly, metal and materials suppliers are often relied on by metalcasters to lead the way in developing future materials. The development of new materials by material suppliers must be in partnership with the industry because the collective resources must be used to understand the production, quality, and environmental needs.

The government has recently begun mobilizing its national laboratories for closer collaboration with U.S. industry. One benefit of government partnerships is that it allows industry to take advantage of the relationship government agencies already have with many research organizations, which makes the process of qualifying for support simpler. There is also the benefit of using existing contacts to find more matches between needs and expertise. Industry trade associations are also powerful instruments for collective action. With delivery systems and relationships already in place, they can be an efficient tool when expanded resources are available.

Another trend has been the increasing development of sponsorship consortiums for a research program rather than for an individual research project. A multi-task program allows the researcher to satisfy many more individual sponsor theories and allows the results of simultaneous tasks to build upon one another. Sponsorship involvement enhances the program through the shared experiences of the companies represented.

Performance Targets

The industry will continue to encourage partnerships and collaborations to combine the experience, resources, and knowledge available in public- and private-sector organizations.

Barriers

The industry realizes that it cannot, on its own, perform all of the R&D and information transfer activities needed to increase or even maintain its competitiveness in the fast-changing world market. For example, although some sectors of the industry have sponsored updating of design standards and materials properties for traditional materials and products, they have not been able to extend this analysis to newer processes and materials. The industry also has trouble keeping pace in its technology transfer efforts because of rapidly changing technology, lack of resources, and poor communications between academia and industry. These barriers and others are summarized in Exhibit 8-1.

Although a few metalcasting companies are highly active in developing advanced technology, the **industry** as a whole is disaggregated, with few technological advances coming out of the numerous small foundries. The industry relies on its **suppliers** to keep it on the leading edge of technology. However, the industry is increasingly using equipment suppliers who are not based in the United States. This has been compounded by the downsizing of some equipment and consumable material suppliers, which has affected the resources available for technology transfer to the industry.

Recent signs indicate a resurgence in the amount of research related to process metallurgy and manufacturing being conducted by **academia**. However, the focus of such research is typically the analysis of existing processes, not the development of radically new processes. The academic research community is key to bringing current scientific discipline to industry problems, but as importantly to form connections between students in training and actual industrial situations. More such connections are needed to elevate the status of manufacturing among engineering students.

Integration with the Technology Roadmap

The metalcasting industry and its technical societies, often working in partnership with government, academia, and its supplier base, have strong research programs in place covering many of the areas discussed in Sections 2, 3, and 4 (a partial listing of ongoing projects is given in Appendix A). The enhancement of these programs will pave the road to increased competitiveness for foundries of the future. In the coming years, foundries will achieve success by engaging in joint research with technical societies, forming partnerships with foundry and non-foundry companies and securing governmental cooperation. Some general types of collaborations that the industry believes could help it achieve its vision of the future are shown in Exhibit 8-2.

Exhibit 8-1. Barriers to Increased Collaboration

AREA	BARRIERS
Industry and Suppliers	Rapidly changing technology Industry disaggregation Reliance on foreign equipment suppliers Lack of resources for R&D Decreasing supplier resources for technology transfer efforts
Academia	Focus of academic research is typically existing processes rather than new processes Poor communication between academia and industry

	Lack of emphasis on forming connection between students and industry

Exhibit 8-2. Suggested Collaborations

Education	R&D	Other
Create partnerships with state and local government agencies to increase interest in metalcasting at the high-school level Develop casting technology and engineering centers at major universities, providing engineering services to casting organizations and training educators and casters alike	Develop joint technology or process development ventures with multi-sector participants Actively involve at least five and preferably more metalcasters in each R&D projects sponsored by trade societies	Develop purchasing cooperatives for buying fuel, electricity, and possibly for handling and treating waste streams Develop small regional consortia to share people, training, equipment, and information

Trade associations, and more recently association consortia, will continue to oversee the industry's overall research efforts. These associations are also leading the effort to seek financial or in-kind contributions from the industry, as many federally funded projects require matching funds. The use of growing information technology will accelerate the sharing of technical knowledge and contribute to the industry's success. The industry and its societies will help secure the future through more effective communication with designers, specifiers, and buyers of structural parts about the advantages offered by cast metal components. The industry will also need to continue its strong relationship with its supplier base, whose previous contributions to increased industry productivity and quality have been invaluable.

The relationship between the metalcaster and the customer (and possibly the casting end user) will need to become more interconnected. Successful foundries of the future will be a natural extension of the customer. Direct access to ordering, scheduling, and inventory status will exist that is cross-linked to the customer floor, with shipments tied to just-in-time needs. Cost and profit goals will be jointly established so that both customers and suppliers will be satisfied.

Metalcasters will need to become parts designers, collaborating with a customer's engineers to create the most economical castings possible. Metalcasters must become proactive in assisting their customers in a continuous product improvement mode where the casting producer will be working ahead of the customer to enhance the designs. In this mode, both will become the beneficiaries of forward-looking engineering concepts for product improvements and cost reductions.

Academic institutions will continue to play a major role in the metalcasting industry of the future, not only to educate scientists and engineers for careers in metalcasting, but increasingly to be involved in applied research programs.